



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

H/A

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/816,015	03/31/2004	Bruno Kristiaan Bernard De Man	146389-2	9547

6147 7590 09/13/2006

GENERAL ELECTRIC COMPANY  
GLOBAL RESEARCH  
PATENT DOCKET RM. BLDG. K1-4A59  
NISKAYUNA, NY 12309

EXAMINER

KAO, CHIH CHENG G

ART UNIT PAPER NUMBER

2882

DATE MAILED: 09/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/816,015		BERNARD DE MAN ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	Chih-Cheng Glen Kao		2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 June 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21, 23-33 and 35-44 is/are rejected.
- 7) ☒ Claim(s) 22 and 34 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some    \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 28, 2006, has been entered.

### *Claim Objections*

2. Claims 1-44 are objected to because of the following informalities, which appear to be minor draft errors including grammatical and/or lack of antecedent basis problems.

In the following format (location of objection; suggestion for correction), the following correction(s) may obviate the objection(s): (claim 1, line 9, "the distributed"; inserting - one or more- - before "distributed"), (claim 1, line 9, "the detectors"; inserting - one or more- - before "detectors"), (claim 1, line 10, "the X-ray sources"; inserting - one or more- - before "X-ray"), (claim 1, line 10, "or detectors"; inserting - the one or more- - before "detectors"), (claim 2, line 1; replacing "comprises" with - comprise- -), (claim 2, line 3; replacing "comprises" with - -comprise- -), (claim 3, line 1; replacing "includes" with - include- -), (claim 4, line 1; replacing "includes" with - include- -), (claim 5, line 1; replacing "includes" with - include- -), (claim 8, line 1; replacing "includes" with - include- -), (claim 11, line 1; replacing "includes" with - -include- -), (claim 12, line 1; replacing "includes" with - include- -), (claim 13, line 1; replacing

Art Unit: 2882

“comprises” with - -comprise- -), (claim 14, line 1; replacing “comprises” with - -comprise- -), (claim 14, line 2; replacing “comprises” with - -comprise- -), (claim 14, line 3, “laser diodes or”; inserting a comma after “diodes”), (claim 15, line 1; replacing “comprises” with - -comprise- -), (claim 15, line 3; replacing “comprises” with - -comprise- -), (claim 18, line 1, “the one or more one-dimensional arrays”; changing the dependency of claim 18 from claim 15 to claim 17), (claim 21, line 2; replacing “includes” with - -include- -), (claim 27, line 1; replacing “comprises” with - -comprise- -), (claim 27, line 3; replacing “comprises” with - -comprise- -), (claim 30, line 1, “one-dimensional array”; replacing “array” with - -arrays- -), (claim 30, line 1, “the one or more one-dimensional arrays”; changing the dependency of claim 30 from claim 27 to claim 29), (claim 33, line 2, “direction..”; deleting one of the periods), (claim 37, line 4, “an X-ray radiation”; deleting “an”), (claim 37, line 5, “the distributed”; inserting - -one or more- - before “distributed”), (claim 37, line 10, “the distributed”; inserting - -one or more- - before “distributed”), (claim 37, line 10, “the detectors”; inserting - -one or more- - before “detectors”), (claim 37, line 11, “the detectors”; inserting - -one or more- - before “detectors”), (claim 37, line 11, “the plurality of projection”; replacing “the” with - -a- -), (claim 37, line 15, “the distributed”; inserting - -one or more- - before “distributed”), (claim 37, line 15, “the detectors”; inserting - -one or more- - before “detectors”), (claim 37, line 16, “the X-ray sources”; inserting - -one or more- - before “X-ray”), (claim 37, line 16, “or detectors”; inserting - -the one or more- - before “detectors”), (claim 38, line 2; replacing “comprises” with - -comprise- -), (claim 38, line 3; replacing “comprises” with - -comprise- -), (claim 39, line 2; replacing “comprises” with - -comprise- -), (claim 39, line 3; replacing “comprises” with - -comprise- -), (claim 40, line 2; replacing “comprises” with - -comprise- -), (claim 40, line 3; replacing “comprises” with - -

Art Unit: 2882

comprise- -), (claim 41, lines 8-9, "the distributed"; inserting - -one or more- - before "distributed"), and (claim 41, line 9, "or detectors"; inserting - -the one or more- - before "detectors").

Claims 2-36, 28-40, and 42-44 are objected to by virtue of their dependency. For purposes of examination, the claims have been treated as such. Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 2, 5, 8-10, 12, 14, 15, 17, 18, 23-26, 41, 42, and 44 are rejected under 35 U.S.C. 102(e) as being anticipated by Zhou et al. (US 2004/0213378).

4. Regarding claims 1 and 41, Zhou et al. discloses a system and method (fig. 8) comprising one or more distributed X-ray sources (fig. 8, #802) substantially surrounding an imaging volume (fig. 8, on #804) and configured to generate X-ray radiation (paragraph 71, line 5) towards the imaging volume, one or more detectors (fig. 8, #806) for receiving the X-ray radiation after attenuation in the imaging volume (fig. 8, on #804) and processing corresponding signals to produce measurement volumetric data (paragraph 64), and a source controller for

triggering one or more emitters in the one or more distributed X-ray sources (paragraph 52) at each instant in time of an image acquisition for creating multiple projections for acquiring volumetric data by the one or more detectors (paragraph 53), wherein the one or more distributed X-ray sources and/or the one or more detectors are arranged about a scanner aperture (fig. 8, aperture of #802 and 806) such that at least one of the one or more X-ray sources or the one or more detectors rotate in relation to the imaging volume during an imaging sequence (paragraph 71, lines 10-12).

5. Regarding claims 2 and 42, Zhou et al. further discloses wherein the one or more distributed X-ray sources comprise at least one stationary distributed source positioned about a scanner aperture (paragraph 71, lines 8-10) and the one or more detectors comprise at least one distributed detector configured to rotate around a scanner aperture (paragraph 71, lines 10-12).

6. Regarding claims 15 and 44, Zhou et al. further discloses wherein the one or more distributed X-ray sources comprise at least one distributed source configured to rotate around the scanner aperture (paragraph 71, lines 10-12) and the one or more detectors comprise at least one stationary and distributed detector positioned about the scanner aperture (paragraph 71, lines 8-10).

7. Regarding claims 5 and 17, Zhou et al. further discloses wherein the one or more distributed X-ray sources include one or more one-dimensional arrays of source elements

Art Unit: 2882

(paragraph 71, lines 4-5, which together form the circular x-ray source) extending substantially around the aperture.

8. Regarding claims 8 and 18, Zhou et al. further discloses wherein the one or more distributed X-ray sources include one or more one-dimensional arrays of source elements extending around at least a portion of the aperture (paragraph 71, lines 4-5).

9. Regarding claims 9, 23, and 24, Zhou et al. further discloses wherein the at least one distributed detector includes one or more two-dimensional arrays of detector elements (fig. 8, #806) extending around at least a portion of the aperture or substantially around the aperture.

10. Regarding claims 10, 25, and 26, Zhou et al. further discloses wherein the at least one distributed detector includes one or more one-dimensional arrays of detector elements (fig. 8, which together form the two-dimensional array of #806) extending around at least a portion of the aperture or substantially around the aperture.

11. Regarding claim 12, Zhou et al. further discloses wherein the one or more distributed X-ray sources include a plurality of independently addressable (paragraph 3, line 6) source elements in one or more arrays.

12. Regarding claim 14, Zhou et al. further discloses wherein the one or more distributed X-ray sources comprise addressable emission devices and the emission devices comprise

Art Unit: 2882

thermionic emitters, carbon-based emitters (paragraph 3, lines 3-4), photo emitters, ferroelectric emitters, laser diodes, or monolithic semiconductors.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. Claims 3, 4, 6, 7, 11, 16, and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou et al. ('378) as applied to claims 2, 5, 15, 17, and 18 above, and further in view of Zhou et al. (US 2002/0094064).

14. Regarding claims 3, 4, and 16, Zhou et al. ('378) discloses a system as recited above. Zhou et al. ('378) further discloses wherein the one or more distributed X-ray sources include arrays (fig. 1) of source elements extending substantially around or around a portion the aperture (paragraph 71, lines 4-6).

However, Zhou et al. ('378) fails to disclose one or more two-dimensional areas.

Zhou et al. ('064) teaches one or more two-dimensional areas (fig. 4, #404).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to include the system of Zhou et al. ('378) with the areas of Zhou et al. ('064), since one would have been motivated to make such a modification for imaging a larger



Art Unit: 2882

object from different areas and/or angles without having to move the object or the x-ray source (paragraph 25) as shown by Zhou et al. ('064), which would reduce wear on a system.

15. Regarding claims 6 and 19, Zhou et al. ('378) further discloses one one-dimensional array of source elements extending substantially around the aperture (paragraph 71, lines 4-6, circular x-ray source). Zhou et al. ('064) further teaches one or more lines (fig. 4, lines from inner to outer edges of #420).

16. Regarding claims 7, 11, and 20, Zhou et al. ('064) further teaches two or more one one-dimensional areas extending substantially around (paragraph 38, lines 11-13), and one or more lines (fig. 4, lines from inner to outer edges of #420).

17. Regarding claim 21, Zhou et al. ('064) further teaches wherein at least one line (fig. 4, line from inner to outer edges of #420) extends at least along a Z-direction (fig. 4, direction along long axis of #418).

18. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou et al. ('378) as applied to claim 1 above, and further in view of Price et al. (US 2002/0085674).

Zhou et al. discloses a system as recited above.

However, Zhou et al. fails to disclose a cold cathode emitter housed in a vacuum housing and an anode disposed in a vacuum housing and spaced apart from the cold cathode emitter.

Price et al. teaches a cold cathode emitter housed in a vacuum housing (abstract, lines 2-3) and an anode disposed in a vacuum housing and spaced apart from the cold cathode emitter (abstract, lines 3-4).

It would have been obvious, to one having ordinary skill in the art at the time of the invention was made, to include the system of Zhou et al. with the cathode and anode of Price et al., since one would have been motivated to make such a modification for reducing the complexity of a scanning system (paragraph 6) as shown by Price et al.

19. Claims 27, 29, 30, 35, 36, and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou et al. ('378) as applied to claims 1 and 41 above, and further in view of Ning (US 6504892).

20. Regarding claims 27 and 43, Zhou et al. discloses a system and method as recited above.

However, Zhou et al. fails to disclose an X-ray source configured to rotate around a scanner aperture and a detector configured to rotate around a scanner aperture.

Ning teaches an X-ray source (fig. 7, #710) configured to rotate (fig. 7, via #713) around a scanner aperture and a detector (fig. 7, #711) configured to rotate around a scanner aperture.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to include the system and method of Zhou et al. with the rotating of Ning, since one would have been motivated to make such a modification for more accurate reconstruction (col. 3, lines 45-49) as implied from Ning.

21. Regarding claim 29, Zhou et al. further discloses wherein the at least one distributed source includes one or more one-dimensional arrays of source elements (fig. 8, #802).

22. Regarding claim 30, Zhou et al. further discloses wherein the one or more one-dimensional arrays of source elements (fig. 8, #802) extend around at least a portion of the aperture.

23. Regarding claims 35 and 36, Zhou et al. further discloses wherein the at least one distributed detector includes one or more two-dimensional or one-dimensional arrays of detector elements (fig. 8, which together form #806) extending around at least a portion of the aperture.

24. Claims 28 and 31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou et al. ('378) and Ning as applied to claims 27, 30, and 29 above, and further in view of Zhou et al. ('064).

25. Regarding claim 28, Zhou et al. ('378) as modified above suggests a system as recited above. Zhou et al. ('378) further discloses wherein the one or more distributed X-ray sources include arrays (fig. 1) of source elements extending substantially around or around a portion the aperture (paragraph 71, lines 4-6).

However, Zhou et al. ('378) fails to disclose one or more two-dimensional areas.

Zhou et al. ('064) teaches one or more two-dimensional areas (fig. 4, #404).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to include the system of Zhou et al. ('378) as modified above with the areas of Zhou et al. ('064), since one would have been motivated to make such a modification for imaging a larger object from different areas and/or angles without having to substantially move the object or the x-ray source (paragraph 25) as shown by Zhou et al. ('064), which would reduce wear on a system.

26. Regarding claims 31 and 33, Zhou et al. ('378) further discloses a one-dimensional array of source elements (paragraph 71, lines 4-6). Zhou et al. ('064) further teaches at least one line (fig. 4, lines from inner to outer edges of #420) extending at least along a Z-direction (fig. 4, direction along long axis of #418).

27. Regarding claim 32, Zhou et al. ('064) further teaches two or more one-dimensional areas (fig. 4, along the inner and outer edges of #420) and one or more lines (fig. 4, lines from inner to outer edges of #420).

28. Claims 37-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhou et al. ('378) in view of Ning and Hsieh et al. (US 5225980).

29. Regarding claim 37, Zhou et al. discloses a system comprising one or more distributed X-ray sources (fig. 8, #802) substantially surrounding an imaging volume (fig. 8, on #804) and configured to emanate X-ray radiation (paragraph 71, line 5), a necessary control circuit

Art Unit: 2882

(paragraph 28, lines 1-6, for controlling the sequence or pattern) operably coupled to the one or more distributed X-ray sources, one or more detectors (fig. 8, #806) for receiving the X-ray radiation after attenuation in the imaging volume (fig. 8, on #804), a source controller for triggering one or more emitters in the one or more distributed X-ray sources (paragraph 52) at each instant in time of an image acquisition for creating multiple projections for acquiring volumetric data by the one or more detectors (paragraph 53), displacing at least one of the one or more distributed X-ray sources, and the one or more detectors (paragraph 71, lines 10-12), a processing circuit operably coupled to the one or more detectors configured to receive the plurality of projection images (paragraph 33, lines 8-11) and to form one or more reconstructed slices representative of the volume being imaged (paragraph 66), wherein the one or more distributed X-ray sources and/or the one or more detectors are arranged about a scanner aperture such that at least one of the one or more X-ray sources or the one or more detectors rotate (paragraph 71, lines 10-12) in relation to the imaging volume during an imaging sequence.

However, Zhou et al. fails to disclose a motor controller and an operator workstation operably coupled to a processing circuit configured to display one or more reconstructed slices.

Ning teaches a motor controller (fig. 7, #713 and 715). Hsieh et al. teaches an operator workstation (fig. 2, #60 and 64) operably coupled to a processing circuit configured to display one or more reconstructed slices (col. 6, lines 16-22).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to include the system of Zhou et al. with the motor controller of Ning, since one would have been motivated to make such a modification for more easily moving components (fig. 7, #713) as implied from Ning.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to include the system of Zhou et al. with the display of Hsieh et al., since one would have been motivated to make such a modification for more easily interpreting image data.

30. Regarding claim 38, Zhou et al. further discloses wherein the one or more distributed X-ray sources comprise at least one stationary distributed source positioned about a scanner aperture (paragraph 71, lines 8-10) and the one or more detectors comprise at least one distributed detector configured to rotate around a scanner aperture (paragraph 71, lines 10-12).

31. Regarding claim 39, Zhou et al. as modified above suggests a system as recited above.

However, Zhou et al. fails to disclose an X-ray source configured to rotate around a scanner aperture and a detector configured to rotate around a scanner aperture.

Ning teaches an X-ray source (fig. 7, #710) configured to rotate (fig. 7, via #713) around a scanner aperture and a detector (fig. 7, #711) configured to rotate around a scanner aperture.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to include the system of Zhou et al. as modified above with the rotating of Ning, since one would have been motivated to make such a modification for more accurate reconstruction (col. 3, lines 45-49) as implied from Ning.

32. Regarding claim 40, Zhou et al. further discloses wherein the one or more distributed X-ray sources comprise at least one distributed source configured to rotate around the scanner

Art Unit: 2882

aperture (paragraph 71, lines 10-12) and the one or more detectors comprise at least one stationary and distributed detector positioned about the scanner aperture (paragraph 71, lines 8-10).

### ***Allowable Subject Matter***

33. Claims 22 and 34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter.

Regarding claims 22 and 34, prior art fails to disclose or fairly suggest an imaging system, including wherein at least one line source comprises a target configured as a hollow cylinder rotating around an axis of the hollow cylinder, in combination with all the limitations in each respective claim.

### ***Response to Arguments***

34. Applicant's arguments with respect to claims 1-21, 23-33, and 35-44 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chih-Cheng Glen Kao whose telephone number is (571) 272-2492. The examiner can normally be reached on M - F (9 am to 5 pm).

Art Unit: 2882

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Chih-Cheng Glen Kao  
Examiner  
Art Unit 2882